

# ALASKA'S STATE-FUNDED AGRICULTURAL PROJECTS AND POLICY— HAVE THEY BEEN A SUCCESS?

## A Senior Thesis

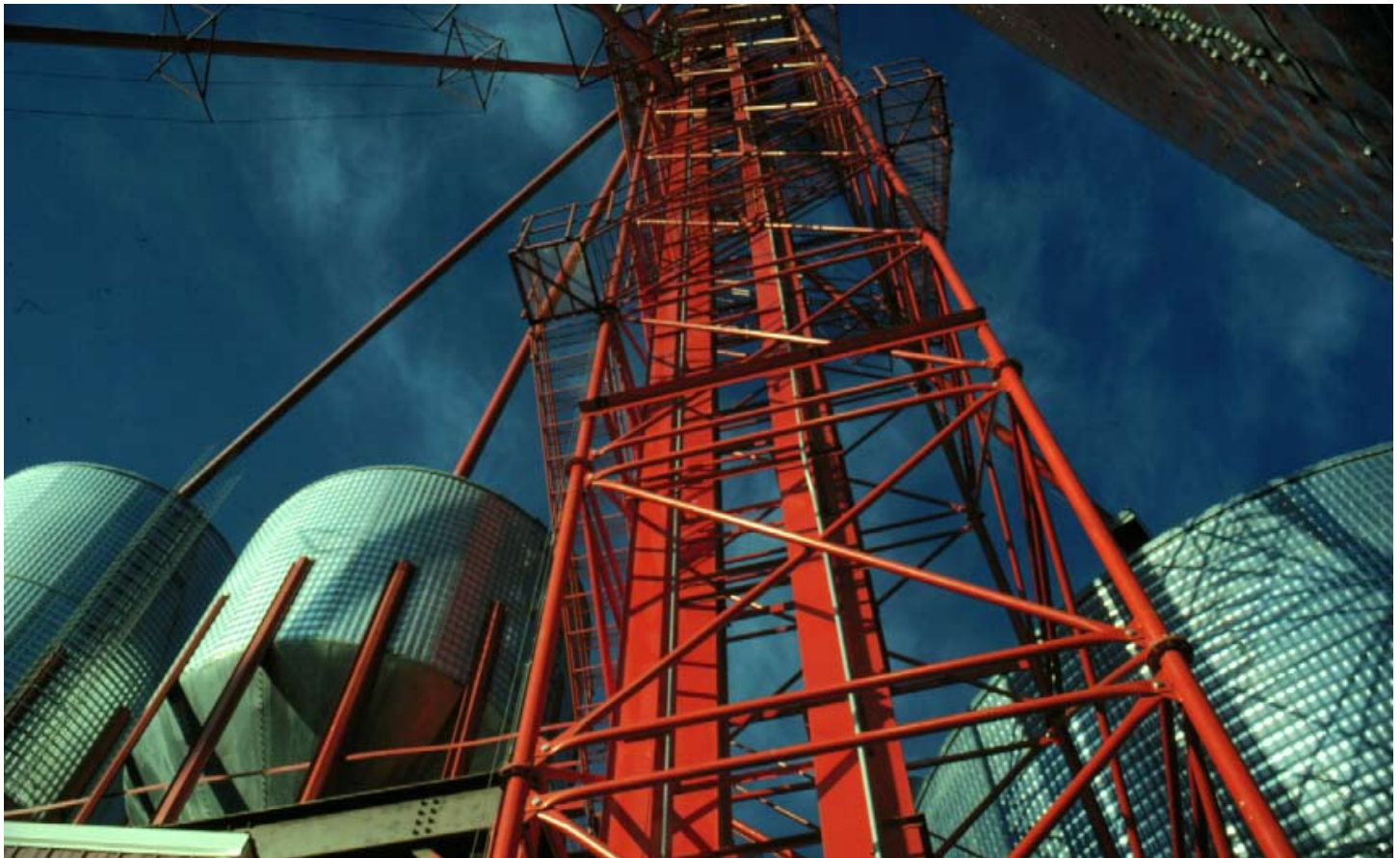
*Presented to the faculty of the School of Natural Resources and Agricultural Sciences, University of Alaska Fairbanks, and the Senior Thesis Committee: J. Greenberg, Chair, H. Geier, S. Sparrow.*

*In partial fulfillment of the requirements for the degree of Bachelor of Science in Natural Resource Management*

*Plant, Animal, and Soil Sciences option*

by Darcy Denton Davies

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Delta Junction grain elevator at the modern farm co-op.

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## Abstract

In the 1970s and 1980s the state of Alaska invested millions of dollars to develop a large-scale agricultural industry. The Delta Barley Project and the Point MacKenzie Dairy Project were created to show that large-scale agriculture was possible in Alaska. This study looks at the major events and policy decisions that occurred and determines how the outcome of the demonstration projects was affected. An extensive literature review was conducted, focusing on state documents; key persons were also interviewed. The projects did not accomplish their original goals for a number of economic and political reasons. The positive aspects of development are that Alaska now has more land in private ownership, more infrastructure to support the industry, and a thriving agricultural community at Delta Junction.

## Preface

The advancement of agriculture in Alaska in the 1970s and 1980s was considered one of the more important times for the Alaska agricultural industry. Numerous policy decisions were made during that period that has shaped the current industry. This thesis charts the history of the large-scale state-funded agricultural projects and identifies major events and management decisions. Through review of past agricultural management decisions, insight can be gained about the current state of agriculture in Alaska and what direction the industry is moving. This thesis will provide a historical overview of that era of development, as well as provide information to managers about past agricultural policy.

## INTRODUCTION

In the late 1970s the State of Alaska developed a task force to address the advancement of an agricultural industry in Alaska. During this time the state had large budget surpluses due to incoming revenue from oil development on the North Slope (Lehne nd). The governor at the time established goals to develop renewable resource industries to spend oil revenues responsibly (AAAC 1981). During this time an exploratory soil survey was conducted, which identified over 20 million acres (8 million ha) of land suitable for agriculture. It was decided that Delta Junction was a good place to start a project demonstrating Alaska's capability for large-scale agriculture. The project land was sold through a lottery system and winners were put on a development schedule and given large loans to get their farms operating. Other tracts of land were surveyed for agricultural production, and a few years later the Point MacKenzie dairy demonstration project was auctioned at lottery, as well as the Delta expansion. Support facilities, such as meat processing plants and grain holding bins, were also planned and built.

The state spent millions of dollars to create this industry (Teal 1982), yet events took place that changed the intended outcome of the projects. It is still a controversial topic, as it is considered a blunder by some and a success by others. The objective of this study is to evaluate whether the major state-funded agricultural projects of the late 1970s and early 1980s accomplished their original goals, and to assess how policy decisions affected the outcome of the projects.

## Review of Previous Investigations

There have been few complete studies done on the long-term effects of the agriculture projects. Many reports were published in the years directly following completion of the first phases of the projects, but most have failed to take a look at later, related events.. Geier and Lewis wrote in 1998 that farms may have been more successful had the state put smaller parcels up for lottery to "make it easier for initial success," which may have allowed for further expansion of the industry.

In 1987 Engelbrecht and Thomas conducted a study about how policy was implemented during this time. The study indicated that there were conflicting agency goals and poor co-operation between the Division of Natural Resources (DNR) and the Alaska Agricultural Action Council (AAAC), which led to many complications during execution of the projects. Over time these conflicts led to decreased public support of the agricultural projects, and the political standing of the AAAC diminished. They concluded that "the degree of success achieved in implementing new policies is largely dependent on the ability of the power interests to negotiate or force change."



## Methods

I conducted an extensive literature review to reveal the history of the projects and state actions. Specifically, I reviewed state papers documenting the policies and actions since the 1970s. Documents from the AAAC were of particular importance. I analyzed statistical data from the Alaskan Agricultural Statistics to ascertain the changes in production since the 1970s. I interviewed key personnel to better understand various agencies' actions and positions on the issues, as well as to obtain information that has not been formally documented. The State of Alaska Division of Natural Resources - Division of Agriculture and the University of Alaska Fairbanks School of Natural Resources and Agricultural Sciences data were particularly significant. I also interviewed various project farmers to understand the state's actions from a producer's point of view. I followed the University of Alaska Fairbanks' Institutional Review Board's guidelines when conducting interviews.

## HISTORY OF ALASKA AGRICULTURE

Alaska has historically been a land of subsistence and the 'hunting and gathering' way of life. Agriculture was first introduced during the 1700s, when Europeans first colonized Alaska (Snodgrass et al. 1982). The Russians began many small

agricultural colonies in such areas as Yakutat, Ninilchik, and Kasilof. Cattle were introduced to the state at this time also.

When gold was discovered in Alaska there was a revival of agriculture. Homesteads were established and the farmers began producing crops for the many prospectors that had migrated into the state. By the time the gold rush had ended many permanent communities had already become established and were thriving. The Tanana Valley was the center of agricultural production up until the 1930s (Snodgrass et al. 1982).

The Matanuska colony was President Roosevelt's plan to breathe life into agriculture and revitalize people during the depression. In 1934, 202 impoverished families were relocated from the lower 48 states to Alaska (Lehne nd). During this time it was shown that agriculture was, in fact, viable in the state. The Matanuska Valley proved to be very capable of producing vegetable crops and became known for its dairy production.

As the Soil Conservation Service began mapping the soils in Alaska in the mid twentieth century, many areas were identified as having potentially arable soils (Snodgrass et al. 1982). In the end the figure reached over 20 million acres (8 million ha) of land suitable for agriculture. The discovery that the state had so much agricultural soil led to the publication of Alaska's Agricultural Production by the Alaska Rural Development Council and the idea of agricultural development again became an interest.



Plowing wheat in the Matanuska Valley, at the Matanuka Experiment Farm.

—AFES FILE PHOTO

## Governor Hammond's Alaska

Governor Jay Hammond entered into office in December of 1974. This was a time of great wealth for the state following the discovery of oil at Prudhoe Bay in the 1960s. Governor Hammond believed the state needed a “renewable resource economic base to sustain [Alaska]” after the oil was depleted (Lehne nd). In 1976 Governor Hammond established the following goals to encourage the development of renewable resources in the state, including agriculture:

- Broaden the economic base of the state through agricultural production.
- Stabilize real food costs by increasing local food.
- Provide alternative job opportunities through expanded agriculture.
- Improve rural life by developing an economic base through agriculture.
- Assist in meeting national goals of increased food production for world needs.

(AAAC 1981)

These goals helped to shape future agricultural development in the state.

In 1975, the Federal-State Land Use Planning Commission for Alaska conducted an in-depth study on the feasibility of agriculture in Alaska. They concluded that agriculture was possible in Alaska and recommended that “a large demonstration area be developed,” and that “efforts be made to designate a considerable portion of land for agriculture” (Faris and Hildreth 1975). This prompted Bob Palmer, Special Projects Coordinator for Governor Hammond, to establish an ad hoc committee to address the study (Lehne nd).

The committee investigated agricultural production and decided to focus on Delta Junction as the first project area. On August 5, 1978, 22 names were drawn by lottery for the opportunity to purchase agricultural rights to the demonstration area land, which totaled approximately 60,000 acres (24,281 ha). This marked the beginning of an era of large-scale state funded agricultural projects.

In 1979 the AAAC was created to manage the Delta project and recommend future projects to the legislature (AAAC 1979). It was composed of five members, three people from the state government and two from the private sector. It was chaired by the Office of the Governor's Special Projects Coordinator (AAAC 1979). This council was the influential body that made recommendations to the legislature, many of which were ultimately funded and completed.

The AAAC generated reasons why the state should support agricultural development. The five reasons are paraphrased as follows:

- Nonrenewable resource wealth must be used to develop renewable resource industries.

- Alaska has enough arable acreage to provide satisfying work and an enjoyable lifestyle for many Alaskans.
  - Alaska should not import 98% of red meat and depend on a system that maintains only a four-day supply.
  - Agriculture is an opportunity for rural people who wish to remain on historic land and participate in the economy of the state.
  - The state can demonstrate that oil wealth is being used responsibly.
- (AAAC 1981)

The AAAC devised many projects to expand the agriculture industry in Alaska. Additional projects were designed for land disposal, meat processing, grain handling, and transportation. Nearly all of the projects that the AAAC recommended to the legislature were funded, but not all were completed. It was also envisioned that 500,000 acres (202,343 ha) of land would be in cultivation by 1992 (AAAC 1982d).

The legislature was very supportive of agricultural development for a number of years, and from 1978–1982 over \$41 million was appropriated to the various projects of the AAAC. In the mid 1980s the political climate changed, following certain setbacks of the projects and tightening fiscal constraints due to dropping oil prices (Lewis and Pearson 1990). Legislators became more reluctant to fund agricultural development, possibly because they were unable to determine how their constituents felt about the projects (Snodgrass et al. 1982). At this time there was also skepticism from the public about the ability of the AAAC and DNR to implement the projects in the public's best interests (Engelbrecht and Thomas 1987). Governor Bill Sheffield took office in 1982, and the administration's support on the previous levels of development was much reduced (Lewis 2007).

In 1984, the effective life of the AAAC concluded and it was not renewed by the legislature. All of its duties reverted back to the Director of the Division of Agriculture (Fowler 1992). Once the AAAC was inactivated no more projects were devised, and it marked the end of large-scale agricultural development in Alaska.

## Delta

The Delta project was designed as an agricultural demonstration, and was intended to specialize in the production of small grains—particularly barley. The intent was to produce grains on a large scale to lower the cost of feed grains, which would in turn stimulate the livestock industry in Alaska (AAAC 1982a). Delta was selected as the site for the large-scale demonstration for a number of reasons. Most important, there was a road system, large areas of state land were available for disposal, agriculture was already practiced there, and the community specifically asked for agricultural development in the area (Lewis and Wooding 1978).

Barley was selected because it is a proven crop in Alaska and export markets had been identified to support the industry. It can mature at cool temperatures and has a short growing



season, both of which are required for successful growth in Alaska (Lewis and Wooding 1978). According to studies, Alaska land produced nearly twice as many bushels of barley per acre as the Great Plains area (Faris and Hildreth 1975). In Alaska's Agricultural and Forestry Experiment Station trials, the highest yielding varieties averaged 76 to 80 bushels per acre (Lewis and Wooding 1978). The barley was expected to be purchased by the small in-state market and eventually to a larger Asian export market (AAAC 1981). The consensus at the time was that Alaska could be competitive with other regions for the Asian markets if the quality and price of the grain was comparable (Thomas 1979).

Agricultural rights to the land of the Delta I project were sold by lottery on August 5, 1978. Twenty-two tracts were included in the sale, averaging 2,600 acres (1,052 ha) per tract, for a total project area of 60,000 acres (24,281 ha) (AAAC 1981). Pre-qualified applicants in the lottery were required to be Alaska residents, have capital of their own to spend, and management ability (Lehne nd). After being selected in the lottery, winners were sold the agricultural rights to the land through the Department of Natural Resources Division of Lands (Division of Legislative Audit 1991). Contracts and loans for land clearing and development were established between the lottery winner and the Governor's Office, but contracts were later transferred to the AAAC. Additional loans for tract development were supplied by the Agricultural Revolving Loan Fund (ARLF). Since the landowners only purchased the 'agricultural rights' to the land, as opposed to a fee simple title, it was much harder to receive loans for capital investments (Johnson 1984). Private lenders felt that loaning money for agricultural rights was too risky because the industry was unstable.

An extension of the first Delta demonstration area was conceived in 1979 and approved by the legislature in 1981 (AAAC 1981). This extension, called Delta II, was to follow the same principles as Delta I and with the extension the state would be able to produce enough grain to support the infrastructure surrounding processing, marketing, and transportation (AAAC 1982b). On March 13, 1982, 24,600 acres (9,955 ha) in 15 tracts were sold by outcry auction (AAAC 1982c). There were no pre-qualifications in the Delta II sale because it was determined by the state court to exceed the government's authority (Engelbrecht and Thomas 1987). Originally the state had proposed a sale of 55,000 acres (22,258 ha) in the expansion, but resource conflicts prompted postponement of the western portion, called Delta II West (AAAC 1982a). There were concerns about using the land for timber, as opposed to agriculture, as well as concerns about the damage the buffalo herd could inflict on potential crops (Engelbrecht and Thomas 1987).

Clearing the land proceeded quickly, and planting crops began in 1980 (AAAC 1981). That year there were crop failures due to adverse weather conditions and predation by a local free-ranging buffalo herd, and the acreage planted produced on

average 30 bushels per acre. While some farms had losses of 20 to 50 percent (Lehne nd), some averaged over 75 bushels per acre (AAAC 1981). All of the grain produced that year, which was 6,000 tons, was sold in-state as livestock feed (AAAC 1982b). The next year, weather, in the form of an early snow, again caused crop loss. Grasshopper infestations also accounted for crop losses during the formative years (Hollembaek 2007). It is probable that these events contributed to the public's doubt about the capability of the project to succeed.

As grain production increased, so did the demand for in-state livestock feed (Lehne nd). The plan was to begin export of barley once there was a reasonable surplus, but as in-state demand increased, the date for export was delayed. At this time there was still no export grain elevator, and in 1983 the Division of Agriculture (DOAg) suggested that construction of the grain terminal be put on hold until production exceeded in-state markets and Alaska barley could be competitive with the world market (DOAg 1983). In the end the Seward export terminal was never completed and the dream of a large export market was not realized.

Also during this time the price of barley, and other agricultural crops, began declining internationally (Division of Legislative Audit 1986). The drop in international prices made imported grain cheaper than barley produced in Alaska (Lewis and Pearson 1990). Too little barley was being produced to



Barley harvest in Delta.  
—AFES FILE PHOTO

export, and prices were too low for that to be an economical solution. As debt mounted, the number of farmers in Delta began decreasing (Division of Legislative Audit 1986). Farmers looked to in-state markets, but it was hard to compete with low prices from the lower 48 states. Some farmers thought that the state was responsible for the mounting debt because certain infrastructure, such as the export grain terminal, had never been completed and was deemed essential to the success of the farms in the University of Alaska's feasibility study and by the Alaska Agricultural Action Council. An investigation by the Division of Legislative Audit showed that farmers would be unable to have debt relieved by filing a lawsuit because the state had never guaranteed funding for additional infrastructure.

In 1990 the debt owed to the state by Delta project farmers totaled over \$53 million, in 1990 dollars (Division of Legislative Audit 1991). The state began to restructure loans with farmers to see some return on its investment. The programs for debt restructuring were generally unavailable to landowners participating in federal assistance programs, such as the Conservation Reserve Program (CRP), that paid to keep land out of production. It was felt by some that the restructuring process was very subjective, and the way it was carried out created distrust of the ARLF.



Dairy cattle in Delta.  
—AFES FILE PHOTO

By 1998 only seven of the original 37 landowners from both projects still retained ownership of their parcels (Geier and Lewis 1998). The rest of the parcels had either been sold by the original tract owner or foreclosed upon and resold by the state. Some of the large tracts that reverted back to state ownership were then subdivided and sold, which put farmers on smaller parcels. Original project farmers who had retained ownership of their land were likely involved in the Conservation Reserve Program or had needed less initial capital investment and therefore accumulated lower amounts of debt (Hollembaek 2007). Currently there are 56 Delta farmers on 29,000 acres (11,736 ha) enrolled in the CRP received a combined annual payment of \$949,703 (Huelskotter, Pers. Comm. 2007<sup>1</sup>).

Delta Junction currently has a diverse agricultural community, though it is not as was envisioned at inception of the Delta Project. There are still farms that are producing traditional crops and livestock, as well as other farms that are producing alternative livestock and niche market crops, and it is viewed as an agricultural community. The goal of a large export market for small grains was never achieved and the export elevator at Seward was never completed. This, coupled with falling grain prices, led to farmers being unable to survive economically. Original project farmers either sold their land or tried to enter different markets. Those who survived and have remained in Delta are extremely loyal to the community and are supportive of the agricultural development that has occurred there.

## Point MacKenzie

Point MacKenzie was designed as a dairy project to supply the Anchorage market, as well as to use the livestock feed being produced in Delta (Snodgrass et al. 1982). The dairy industry depends heavily on infrastructure and other industries, so it was assumed that a revitalized dairy industry would create jobs and boost the local economy. There was once a relatively large dairy industry in Alaska, but during the 1960s many farms either consolidated or went out of business. By expanding the existing industry it was believed that the production of dairy products would become more feasible through an economy of scale (AAAC 1979). Point MacKenzie was designed as a 15,000 acre (6,070 ha) project with 31 tracts, 19 of which were designated as dairies and 12 others that were to be supplemental farms for growing feed and other crops (AAAC 1981).

A feasibility study was conducted in 1980 that estimated the productivity of dairy operations at Point MacKenzie (Lewis et al. 1980). According to the study a farm could achieve a positive cash flow by the second year in operation, assuming that the price paid to the farmers remained at or above \$16.84 per cwt (one hundred pounds of milk). The authors also stated the dairy industry could only grow if the farmers used best management

1. E-mail dated 18 April 2007 from Helga Huelskoetter. Program Technician, Farm Service Agency Northern County.



practices and if the processing sector became more efficient.

The project was scheduled for sale March 6, 1981 (Fowler 1992). The lottery took place, but was later thrown out by the court based on the fact that the state had required a farm conservation plan or dairy farming experience to qualify, which was deemed to be exceeding the state's own authority (Englebrecht and Thomas 1987). Two tracts were not included in the lawsuit because they were Matanuska-Susitna Borough land, and remained with the original lottery winner. Another lottery was held in September 1982, and this time no previous dairy farming experience was required to be considered for the lottery. The winners signed contracts that gave them agricultural rights to the land and established deadlines for land clearing, crop production, and production of milk.

Under the contract signed for the loans, farmers were expected to clear land, begin producing crops, and start milking cows in three years (Fowler 1992). At the start of the project milk prices were high, around \$22 cwt, and farmers felt confident in their investments. By 1983 one farm had already begun producing milk and the others were clearing property in anticipation of milking cows. Milk was being sold to Matanuska Maid, the oldest milk processor in the state. Matanuska Maid is located in Anchorage and was a major catalyst in beginning the Point MacKenzie project (Lewis et al. 1980). At the end of 1983, Matanuska Maid was unable to repay its debts and filed for bankruptcy and the price paid to producers immediately dropped (Fowler 1992). These events brought public attention to instability in the dairy industry.

The loan limit from the Agricultural Revolving Loan Fund was capped at \$1 million, and some farmers were already at or near this limit (Fowler 1992). Many farmers had initially invested in expensive barns, which left little or no money for other expenses, such as cows and equipment. The increased debt load made farms less likely to be successful.

Farmers had trouble staying on schedule, but were told the schedule was inflexible. Around this time the state took ownership of Matanuska Maid, which was deemed necessary to keep the dairy industry operating (Van Treeck 2006). The ARLF previously loaned \$4.5 million to Matanuska Maid (Division of Audit and Management Services 1990), but even more compelling was the investment made in the dairies at Point MacKenzie. Without the processor, the state believed the dairy industry it was trying to create would inevitably fail (Alaska Ombudsman 1989). Matanuska Maid, because it was state owned, was required to purchase all the milk produced that met quality standards (Fowler 1992). Though most farmers faced financial challenges, milk was being produced in significant quantities by 1986, so much so that Matanuska Maid stopped importing milk, but at the same time their sales were down.

During this time the Matanuska area was going through a recession (Alaska Ombudsman 1989). Unemployment rates in the area rose to 12 percent, and bankruptcies increased 250 percent through 1984. Businesses in the area had to downsize and cut costs to survive. Local feed suppliers were unable to supply

Point MacKenzie farmers because most could not afford to buy feed with cash, and suppliers were not willing to accept their credit. Farmers in the Point MacKenzie project began having problems repaying debt and keeping their dairies operating. As production decreased in 1988, Matanuska Maid began importing milk again. By 1990 over 50 percent of Matanuska Maid's milk was being imported, and coincidentally their sales began rising (Fowler 1992).

As of 1992, only two dairy producers remained at Point MacKenzie (Fowler 1992). This number has fluctuated through the years, but has stayed steady with at least one producer in Point MacKenzie at any time. The Point MacKenzie dairy project did not meet the expectations envisioned by the state. Some of the landowners at Point MacKenzie invested in the land as speculators, waiting to sell when the agricultural zones are lifted and the Knik Bridge is built (Fowler 1992). Instead of creating a sustainable industry, the state instead became owner of the primary milk processor in southcentral Alaska and watched as most of the dairy farms at Point MacKenzie underwent financial trouble and eventually failed. As dairies from Point MacKenzie defaulted on debts and went out of business, Matanuska Maid began importing more milk from out of state. Currently there are only nine grade A dairies in the state, down from sixteen at the height of Point MacKenzie's production in 1986 (Alaska Agricultural Statistics Service 1976–2006).

## Nenana-Totchaket

The Nenana-Totchaket area has been considered an area with some of the most prime agricultural soils in the state (AAAC 1981). The proposed project was located west of the city of Nenana in a remote area. The original thought was that the producers would be linked to markets through the adjacent railroad, and agriculture would begin to expand westward. The Natural Resource Conservation Service (NRCS) (at that time the Soil Conservation Service) identified 175,000 acres (70,820 ha) of agricultural soils in the area between the Tanana and Kantishna Rivers. The feasibility study conducted assumed that this project would be much like Delta and be a small grain-producing area (AAAC 1982a).

In 1980 the legislature appropriated \$500,000 for design and development of the project. In 1982 the AAAC asked the legislature to fund further development of the project and that a lottery sale for 75,000 acres (30,351 ha) take place as soon as possible (AAAC 1982a). In 1983 the Division of Agriculture suggested that the sale be delayed until analysis of the previous projects had been completed, to help determine if the investments needed to complete the Nenana-Totchaket project would result in sufficient benefits to Alaska (DOAg 1983). It is possible that funding for a bridge and access to the remote location was more than the legislature was willing to do, because no more appropriations were made and the project was never completed (Lewis 2007).

## Infrastructure

The infrastructure proposed, which would support the grain, dairy, and red meat industries, was seen as a “vital link between the producer and the consumer” (AAAC 1979). It was viewed as essential to the economic success of the projects that certain facilities were in place. To make the facilities available to the producer quickly, the AAAC knew the facilities would have to be government owned and managed for a period, but felt that “as soon as possible, the ownership and management function should be transferred to the private sector” (AAAC 1979).

A grain elevator at port was considered a necessity to the success of a small grain export industry. Seward was selected as the preferred city for its location because it was connected to the railroad system (Lewis 2007). Under this plan, grain trucked to Fairbanks from Delta would be loaded on rail cars and travel to Seward, stopping along the way to deposit grain for livestock producers in various towns (AAAC 1982a). The AAAC recommended that the legislature spend \$6.5 million to construct the terminal elevator.

Construction of the grain terminal began in 1981. The legality of the AAAC hiring contractors and leasing land was questioned, and work was halted later that year (Division of Internal Audit 1981, AAAC 1982a). Once Governor Sheffield took office no additional appropriations were made to fund the construction and the terminal elevator was never realized (Lewis 2007). Despite the \$6.5 million invested, the state placed further grain terminal appropriations on hold until there was increased production to support it (AAAC 1983). It is also possible the state thought the terminal being built in Valdez would be suitable, and did not wish to fund a redundant facility (Hammond 1994). That additional investment never materialized and the Seward facility is currently a concrete pad still owned by the state and used for various purposes, none of which are grain exportation (Lewis 2007).

The city of Valdez began construction of a grain terminal concurrently with the Seward project. The city of Valdez thought that it should be the place of grain export since all the oil from the North Slope was being shipped out from the same location. The state did not support a grain terminal at Valdez because it was not a part of the railroad system (Lewis 2007), but Valdez built one regardless. The building site was chosen poorly, and the terminal needed approximately \$500,000 in dredging to allow barges close enough to load grain (Alaska Cooperative Extension Service 2006). No grain was ever exported using the Valdez grain terminal.

A livestock processing facility was also deemed necessary to “complete the feed grain-livestock cycle” (AAAC 1981). Livestock numbers were expected to increase as grain production increased, and the existing slaughterhouses at the time would be unable to accommodate for the growth. The legislature appropriated \$2.65 million for the development of these facilities (AAAC 1982a), in the form of loans to private builders (Teal 1982). A slaughterhouse was built in Fairbanks, but it was

leased and later sold to Interior Alaska Fish Processors without ever being used for livestock slaughter (Knight 2007). Mt. McKinley Meat and Sausage (MMMS) was built in Palmer and began operation in December of 1983 (AAAC 1983).

The Palmer facility was designed to handle 100 hogs per day and 50 cattle. It stayed in operation for two years, but was foreclosed by the Agriculture Revolving Loan Fund in 1985 (Torgerson et al. 2003). The facility remained closed until 1987, when the Department of Corrections reopened it to use for rehabilitation and training of inmates. The MMMS continued to lose money and was unable to cover its operating expenses. In 2002 MMMS was able to cover operating expenses, but it was still unable to cover other expenses, such as wages. This was the closest it had come to being economical since its inception.

In 2002 the Division of Agriculture developed a request for proposals that would allow for a \$1 per year lease to operate MMMS in an attempt to get the losing venture out of state control. Although there was a lot of interest in the proposal request, no one submitted a responsive proposal and MMMS remained state operated. MMMS debt is paid out of the ARLF, which is steadily decreasing in funds and entirely pays for the operation of the Division of Agriculture, so the division has continually tried to decrease expenses and transfer the facility to private ownership (Torgerson et al. 2003). It has been suggested in the past that the facility be shut down, but the state recognizes the need that MMMS meets for the community. Currently MMMS remains under state ownership and management, and steps are still being taken to minimize expenses and reduce losses (DeVilbiss 2006).

A grain handling facility was constructed in 1980 in Delta Junction that provided an elevator, drying, and storage for Delta grain producers (AAAC 1981). It cost approximately \$1,300,000 in loans to a private business to construct, and had to be expanded almost immediately to deal with all the grain being produced in Delta. In 1985, when grain production dropped dramatically, it was foreclosed upon by the state (Alaska Cooperative Extension Service 2006). Currently it is owned by the ARLF, but is leased for \$1 a year by the Alaska Farmers Cooperative, Inc. It is used for grain and fertilizer storage for farmers in the Tanana Valley.

## Analysis

Through the years the Alaska state government spent millions of dollars to create a large scale agricultural industry. In appropriations alone, over \$76 million, in 2006 dollars, was spent on the projects (Table 1). Even more millions of dollars were spent on the ARLF loans to farmers. It is debatable whether the funds expended were worth the benefits created. It is interesting to note that appropriations made to Delta I spanned a period of a few years, whereas all infrastructure appropriations came in a lump sum in one year.



**Table 1. Direct Appropriations made by the Alaska Legislature, 1978–1982 (in 2006 \$)**

Project	Year*					Total
	1978	1979	1980	1981	1982	
Delta I	\$11,296,253	\$14,844,849	\$3,671,072	\$1,595,762	0	\$31,407,936
Delta II	0	0	0	\$15,136,876	0	\$15,136,876
Point MacKenzie	0	0	\$9,223,568	0	\$392,286	\$9,615,854
Nenana-Totchaket	0	0	\$917,768	\$840,760	0	\$1,758,528
Infrastructure <sup>†</sup>	0	0	0	\$18,748,949	0	\$18,748,949
						\$76,668,143

\*PPI (all commodities), not seasonally adjusted, normalized to 2006

<sup>†</sup> includes processing facilities, export terminal, rail hopper cars, and marketing

Source: Teal, D. 1982. Financing agricultural projects in Alaska. Juneau: State of Alaska, House Research Agency report 81-5

The projects increased overall commodity production in the state for a period of time. Total acres planted in crops rose during the period that the Delta project was created (Fig 1). Represented in the total cropland are many agronomic crops, such as hay, oats, and grass, and acreage dedicated to those commodities was highest during the projects' initial years. Acres in cropland dropped after a few years, in the mid 1980s. This was when farmers at the Delta project were going through financial troubles, and the international price of grains had dropped. The peak in 1984 of 41,000 acres (16,592 ha) has not since been reached. It is important to note that acreage in cropland

is presently at higher levels than before the agricultural projects were established. The 100,000 acres (40,469 ha) of project land put into private ownership appears to have made an impact on agricultural production, but not to the extent that was envisioned. The AAAC had a goal that 500,000 acres (202,343 ha) would be in production by 1992, and this obviously did not occur.

Acreage planted in barley increased dramatically in the years following the lottery for Delta I, but started to decline in the mid 1980s (Fig 2). The decline is due to a combination of factors, including dropping grain prices, farmer turnover,

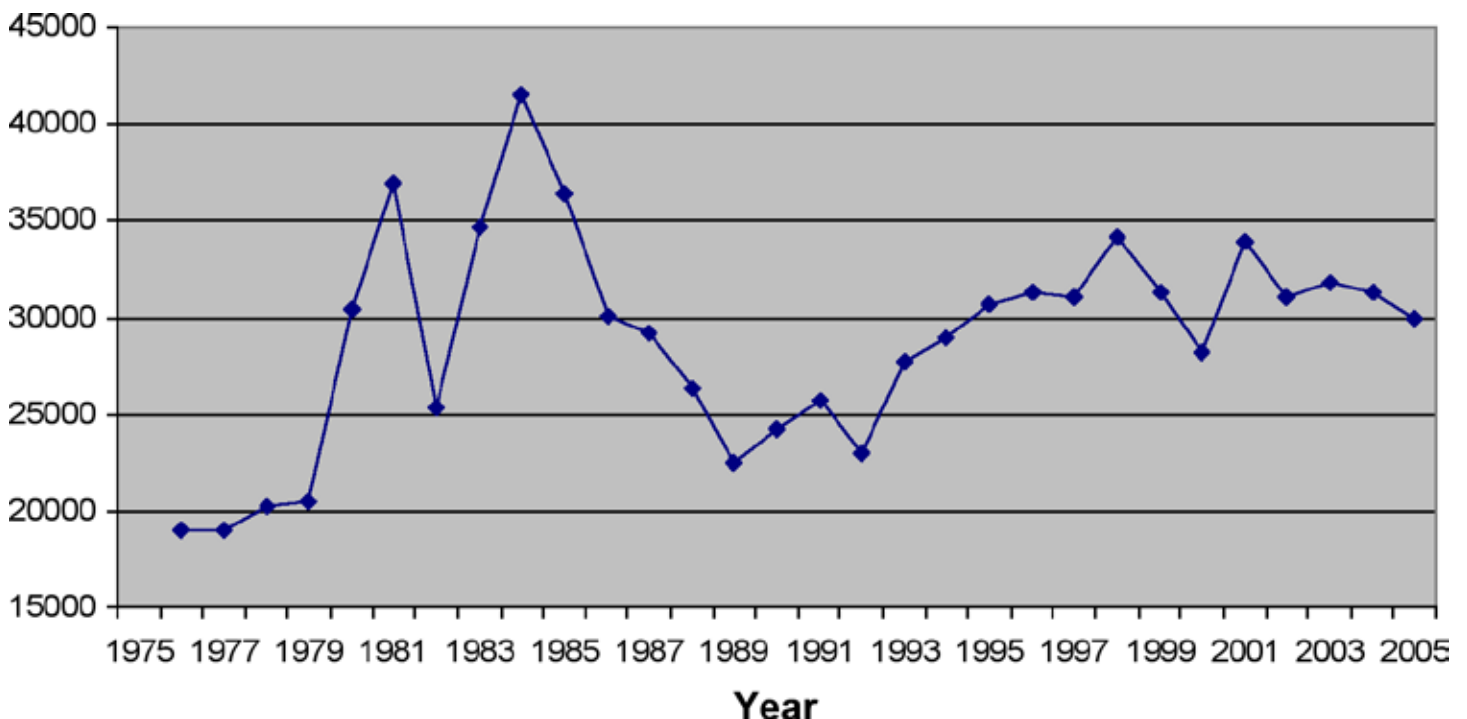


Figure 1. Alaska Cropland Utilization, 1976-2005. Source: Alaska Agricultural Statistics Service 1977–2006.

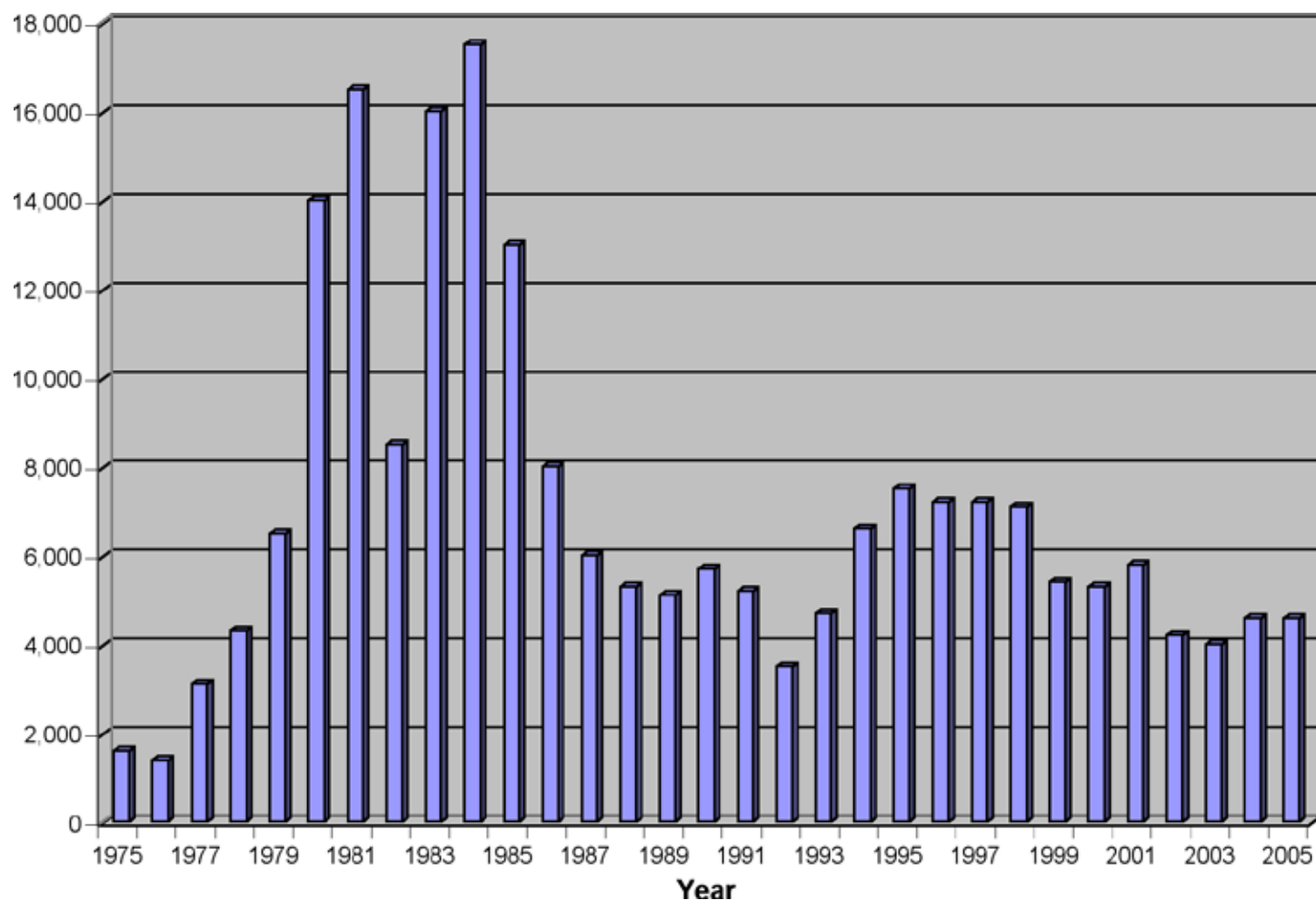


Figure 2. Alaska Acreage Planted in Barley, years 1975-2005. Source: Alaska Agricultural Statistics Service 1976-2006.

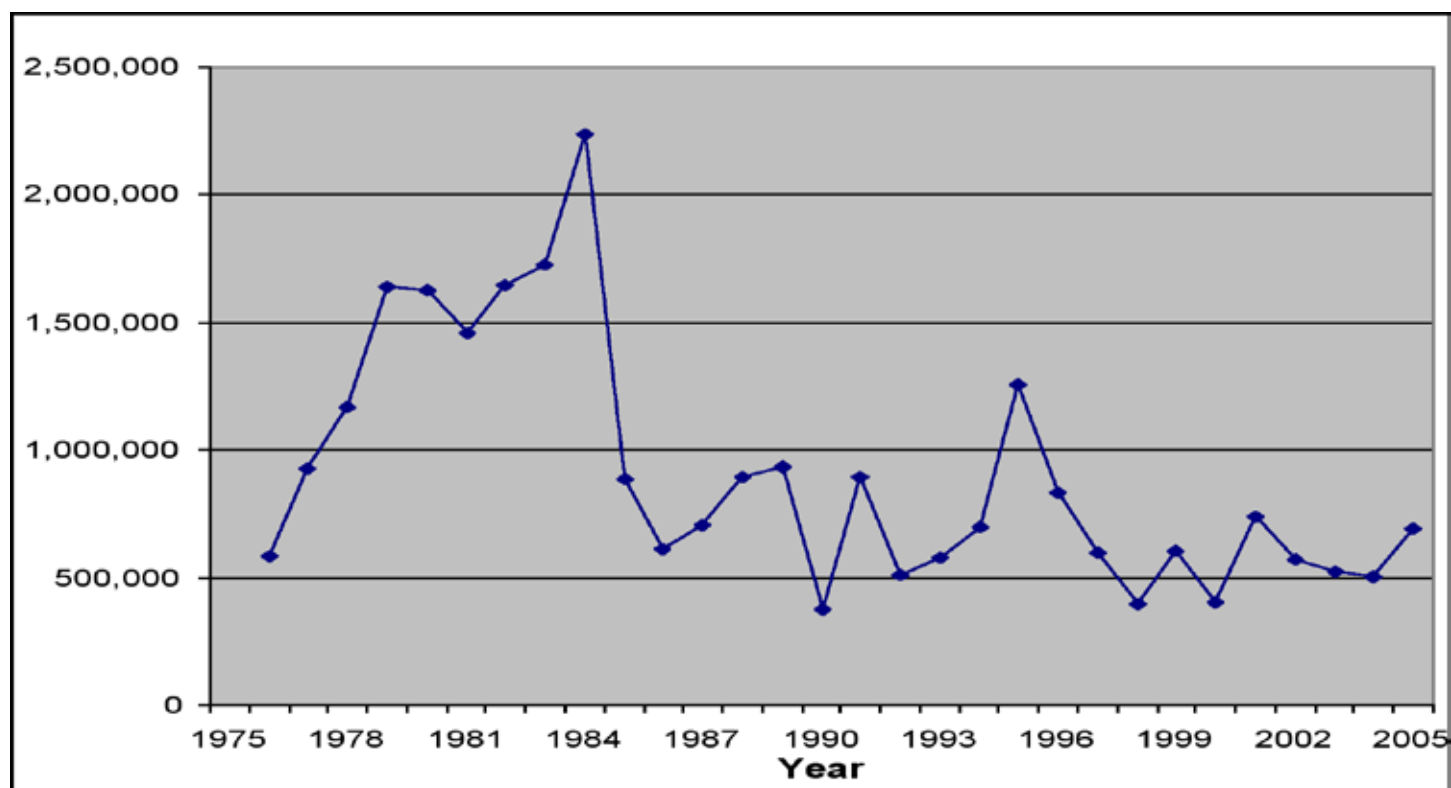


Figure 3. Alaska Cash Receipts for Barley, 1976-2005. PPI (all commodities), not seasonally adjusted, normalized to 2006 dollars. Source: Alaska Agricultural Statistics Service 1978-2006.



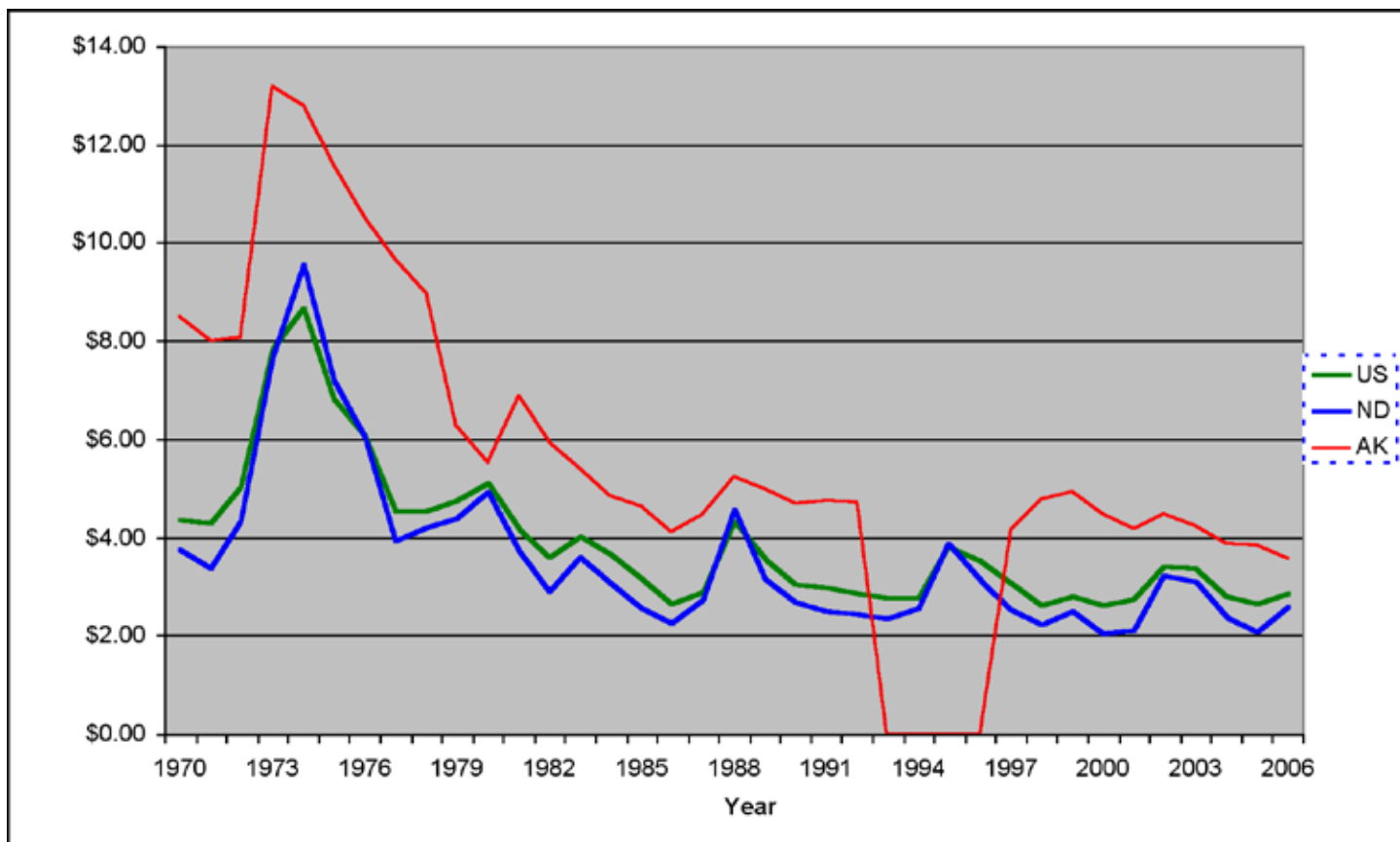


Figure 4. Barley Prices for the United States, North Dakota, and Alaska. Dollars per bushel, 1970–2006. PPI (all commodities), not seasonally adjusted, normalized to 2006 dollars. Source: USDA National Agricultural Statistics Service

and land being devoted to the Conservation Reserve Program. Barley production acreage has not fallen back to the low levels before 1978 and has remained between 4,000 and 8,000 acres (1,619-3,237 ha) over the past ten years. The projects affected barley production, but did not reach the expectations of the planners. The industry was supposed to grow to completely fill the in-state need and the surplus was to be sold on the world market. However, as prices dropped and production decreased the terminal was put on hold.

The cash receipts paid to farmers for barley peaked in 1984, at over \$2 million (Fig 3). Considering that each project farmer owed close to or over a million dollars, it is clear why many farmers were unable to pay back their debts. Nationally, barley prices were high during the planning stages of the Delta I project, but have been on a downward trend since 1974 (Fig 4). It is interesting that barley prices had already begun dropping when the ad hoc committee designed and created the Delta I project.

The level of milk production rose significantly during the late 1980s (Fig 5, p. 12). This rise can be attributed to the increased production from the Point MacKenzie project. Landowners were receiving large loans to bring farms into production swiftly, and some were quickly reaching the \$1 million loan limit. The rapid rise in production began in 1984 and peaked in 1987 at 35,000,000 lbs. of milk produced in the state of Alaska. The increase envisioned by the project's creators in Alaska milk production was short lived, and by 1987 milk production

began dropping. The decrease in production can be attributed to the numerous financial troubles that plagued area farmers, which led to foreclosures. Since 1991 production has remained relatively stable and comparable to production before the Point MacKenzie dairy project was established.

Based on the statistical data it is clear that project commodity production increased during the initial years of development, but drastically dropped in the mid to late 1980s. As farms in the Delta area accrued debt and were foreclosed upon, those acres went out of production. Many farms on Delta project land were placed into the Conservation Reserve Program (Knight 2007), which also accounts for the decrease in barley acreage. Milk production increased rapidly as farms were being subsidized and large investments were made to quickly begin milk production. Milk production decreased as debt mounted and farms were abandoned. The 'boom and bust' cycle exhibited by barley and milk production is indicative that the project goals were not achieved and that the projects were not sustainable, which is due to a number of factors.

## Discussion

Governor Hammond had grand ideas about the creation of an agricultural industry from oil profits. The goals of his administration were to broaden the economic base of the state

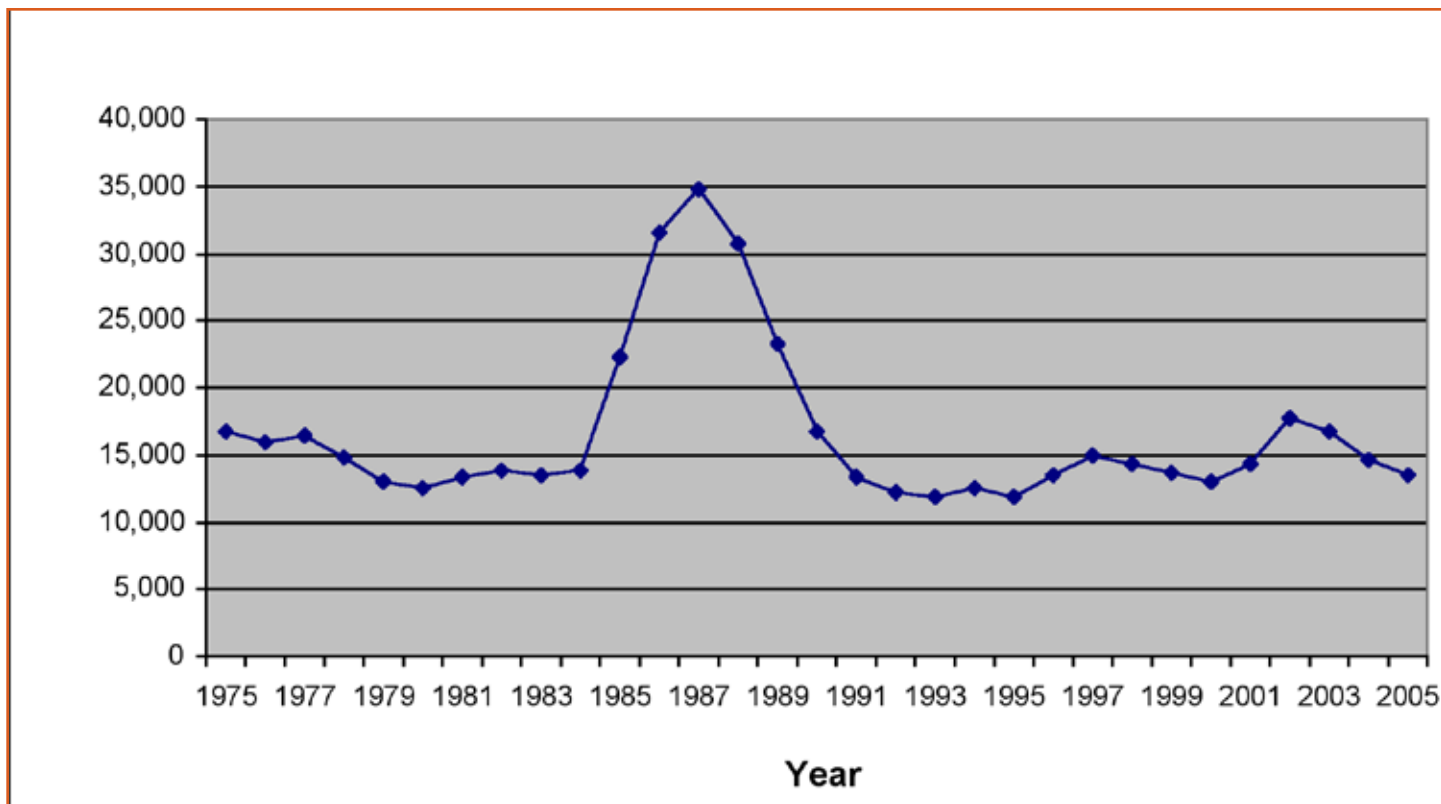


Figure 5. Alaska Milk Production, years 1975–2005. Source: Alaska Agricultural Statistics Service 1976–2006.

through agricultural production, stabilize real food costs by increasing local food, provide alternative job opportunities through expanded agriculture, improve rural life by developing an economic base through agriculture, and assist in meeting national goals of increased food production for world needs. Examination of the outcomes provides little evidence that any of these goals were achieved.

Agriculture is a minor component of Alaska's economy. Governor Hammond once said he believed "it is in fact possible that Alaska will be the prime agricultural state in the not too distant future" (Lehne nd). While Alaska does have dedicated farmers and agriculturalists, the industry is nowhere near the industrial scale that was envisioned in the design of the projects. Agriculture as an industry currently makes up less than one percent of the revenues earned from all resource industries in the state (Alaska Cooperative Extension Service 2006).

An increase in local food production has occurred, but not to the extent that was envisioned. Washington State is still the primary supplier of milk to the state, supplemented by the small amount produced in-state. Currently there are two milk bottlers in the state, Matanuska Maid and Northern Lights Dairy (Van Treeck 2006).<sup>2</sup> Northern Lights Dairy is located in Delta and uses only Alaska milk (Lewis and Pearson 1990). As of 1998, Matanuska Maid processed about 30 percent Alaska milk, with the rest imported (Division of Legislative Audit 1998). Alaska red meat production has increased since the 1970s, but so has the population of Alaska. The state still imports about

95 percent of its food (Alaska Cooperative Extension Service 2006), and increases in commodity production have probably been only enough to counteract population growth and keep food importation at the levels it was in the 1970s.

The development of Alaska agriculture came along as the importation of commodities was becoming more efficient. Currently there are no price incentives for Alaska to become self-sufficient, considering how the markets have changed and how effectively air and land transport have brought food and products to Alaska (Division of Legislative Audit 1998). Though this system is not infallible, as adverse circumstances can slow or stop transportation, it has worked well enough that Alaska has not substantially decreased its dependence on importing food.

As far as improving rural life by developing an economic base through agriculture and assisting in meeting goals of increased food production, this simply did not occur. Although the local economy of Delta has been affected by the agriculture practiced there, based on commodity production it is doubtful the Matanuska Valley's economy is greatly affected by the Point MacKenzie development. Nenana-Totchaket was never completed, so development of a western Alaska agriculture economy was not accomplished. Grain production never reached the levels that had been imagined and the export terminal was never finished, so Alaska does not play a role in meeting world grain needs.

In the late 1970s and early 1980s, the rest of the United States was experiencing a farm crisis (Public Agenda Foundation 1987). A third of the nation's farmers were experiencing

2. Editors' note: now one, since Matanuska Maid was shut down at the end of 2007 and is scheduled for sale.



financial troubles due to falling land values, low commodity prices, and mounting debt. The fiscal policies of the Carter and Reagan administrations escalated farmers' problems because the industry is extremely capital intensive, dependent on interest rates and heavily subsidized (Buttel 1989). Declines in United States commodity prices, including small grains, began in 1984 (Buttel 1989), which happens to be the peak year of Alaska barley production (Alaska Agricultural Statistics Service 1985). Alaska's attempt at creating an agriculture industry happened to coincide with this arduous time in American agriculture, from which it could not have benefited. Alaska farmers were at more of a disadvantage because the project land was bought at a time when agricultural lands had reached peak values, and it still took a few years of clearing and capital investment before the farmer could begin producing crops and making money (DOAg 1985).

There are federal government programs that have the potential to help stabilize commodity prices. The Commodity Credit Corporation (CCC) is managed by the Farm Service Agency (FSA), and its major functions are preservation of farm prices and income, as well as maintenance of supplies and balanced distribution of agricultural commodities.<sup>3</sup> Programs such as this could have helped to stabilize barley prices during the Delta project's formative years, but many farmers did not use the program. Some of the programs require a licensed grain elevator in the state for eligibility, which leaves Alaska's grain industry at a disadvantage (Alaska Cooperative Extension Service 2006).

The Conservation Reserve Program is one government program that helped farmers retain control of their land (Knight 2007). By paying farmers to keep 'conservation covers' on their land the farmers did not have to invest in capital for high-risk crop production that may not be of suitable quality or quantity to make land payments. This land was not under cultivation, and was set aside as wildlife habitat, which allowed some landowners to receive an income without actually farming the land (Geier and Lewis 1998).

The agricultural projects were created using a system that was very governmentally 'hands on' (Lewis and Pearson 1990). The land was made available by the state, the state gave loans to landowners to develop farms, and the state invested millions of dollars to build support facilities that were supposed to boost the industry. Eventually, administration changes coupled with project setbacks and tightening fiscal constraints due to dropping oil prices led to less political and financial support for the government-funded projects. Legislators began asking when "enough is enough" and how much more money should be expended on the agricultural projects (Lehne nd). Lewis and Pearson noted in their 1990 study that a "hands-off model" of agricultural development would probably be most successful in Alaska. This model has been exhibited by the vegetable industry, especially potatoes and carrots. The vegetable industry uses a smaller land base than grains, but received \$4.7 million in cash

receipts in 2005, compared with \$787,000 for barley and oats (Alaska Agricultural Statistics Service 2006).

The trend in Alaska agriculture has shifted from traditional large-scale farms to smaller farms that produce for a niche market (Alaska Cooperative Extension Service 2006). Farmers' markets that supply local products to local consumers are growing statewide. There is room for growth in the alternative livestock industry, which emphasizes animals that are both well suited to Alaska and are a high value commodity. Currently, the most lucrative agricultural businesses in Alaska are greenhouses and aquaculture. The most traditional agronomic crop receiving the highest cash receipts is hay, which is mostly being used by recreational horse owners (Alaska Cooperative Extension Service 2006, Alaska Agricultural Statistics Service 2006).

The Delta project failed at creating a sustainable large-scale grain industry in Alaska. There have been positive outcomes from the Delta development, such as the agricultural community that has grown there. Dr. Lewis, Dean of the University of Alaska Fairbanks School of Natural Resources and Agricultural Sciences and co-author of the Delta and Point MacKenzie feasibility studies, has stated that the Delta project has shown that agriculture in Alaska is possible under certain conditions, and that it can be successful (2007), though the level of success envisioned in the large-scale agricultural projects has obviously not been achieved. The project did put large amounts of state-owned land into private ownership, and most of it is still being used for some type of agricultural enterprise.

The Point MacKenzie project has less success to show for all the money that was invested in it. Only two dairies remained in 1992 out of nineteen that were proposed, one of which was an original lottery winner (Fowler 1992). Point MacKenzie had many problems, such as lawsuits and the bankruptcy of Matanuska Maid, which hindered success. It is troubling that the state did not anticipate Matanuska Maid's impending bankruptcy. The project had been underway for less than a year before the processor declared bankruptcy. Probably the most detrimental factor to the project's success was the development time scale imposed on farmers. The project was designed with a development schedule that was too fast for nearly all of the farmers. They built up large amounts of debt quickly and were either unable to stay on schedule or make payments due to the decrease in milk prices. Lottery winners were not required to have dairy experience, and as such were unprepared for the circumstances that followed.

The Point MacKenzie project was based on numerous assumptions from the University of Alaska's feasibility study that did not materialize after inception. It was assumed that milk prices of \$16.84 cwt would be sufficient for farmers to make a profit. However, later studies showed that the Point MacKenzie dairies needed up to \$50.90 cwt to support their capital investments (Fowler 1992), which is an alarming difference. It was envisioned that Point MacKenzie farmers would be able to buy grain from the Delta project, but as grain prices dropped and farms pulled out of production, that was never realized. Land

3. Farm Service Agency website. Commodity Credit Corporation. <http://www.fsa.usda.gov/FSA/webapp?area=about&subject=landing&topic=sao-cc>

clearing costs were underestimated, which led to farmers quickly reaching their \$1 million loan limit, along with excessive amounts being invested in capital expenses. Parts of the feasibility study were unrealistic, and it led to overoptimism about the potential risks and investments involved.

The Point MacKenzie project was envisioned as a large-scale dairy project, just as Delta was designed as a large-scale grain industry. The successes of the projects are that 100,000 acres (40,469 ha) have been transferred to private ownership and that there are now support facilities available to producers, even though most are state owned. In both cases, experience of the farmers was limited and large capital investments were either required or advocated, before profits could be achieved. Events not predicted by the development councils, such as adverse weather, decreased commodity values, and political decisions were detrimental to the outcome of the projects.

Based on the information and sources available, some lessons can be learned from the state-funded agricultural projects. The way that the projects were planned and carried out was instrumental to the outcome. The ideas proposed were grand and designed on an immense scale. Generally, creating an industry such as this would take generations to accomplish, but the planners tried to create it in a short time. Administration changes proved volatile for the projects in their formative years, and those routine changes of the political climate were not conducive to industry growth. Not only was there a high rate of farmer turnover, but project administrators also came and went, which created a loss of continuity.

There were setbacks in the early years, which were potentially minor events, but administrators saw this as a mark of failure, lessening their support for additional funding. It seemed as though some administrators were willing to cut their losses when the projects did not go exactly as planned. The industry was designed on an intricate scale with many interconnected parts, and each piece depended on the others. As certain parts fell through, such as the Seward Grain Terminal and the Matanuska Maid bankruptcy, the chance of success for the rest of the projects decreased. Government can create a climate to encourage industry growth, but it is inappropriate for government to entirely fund and create an industry.

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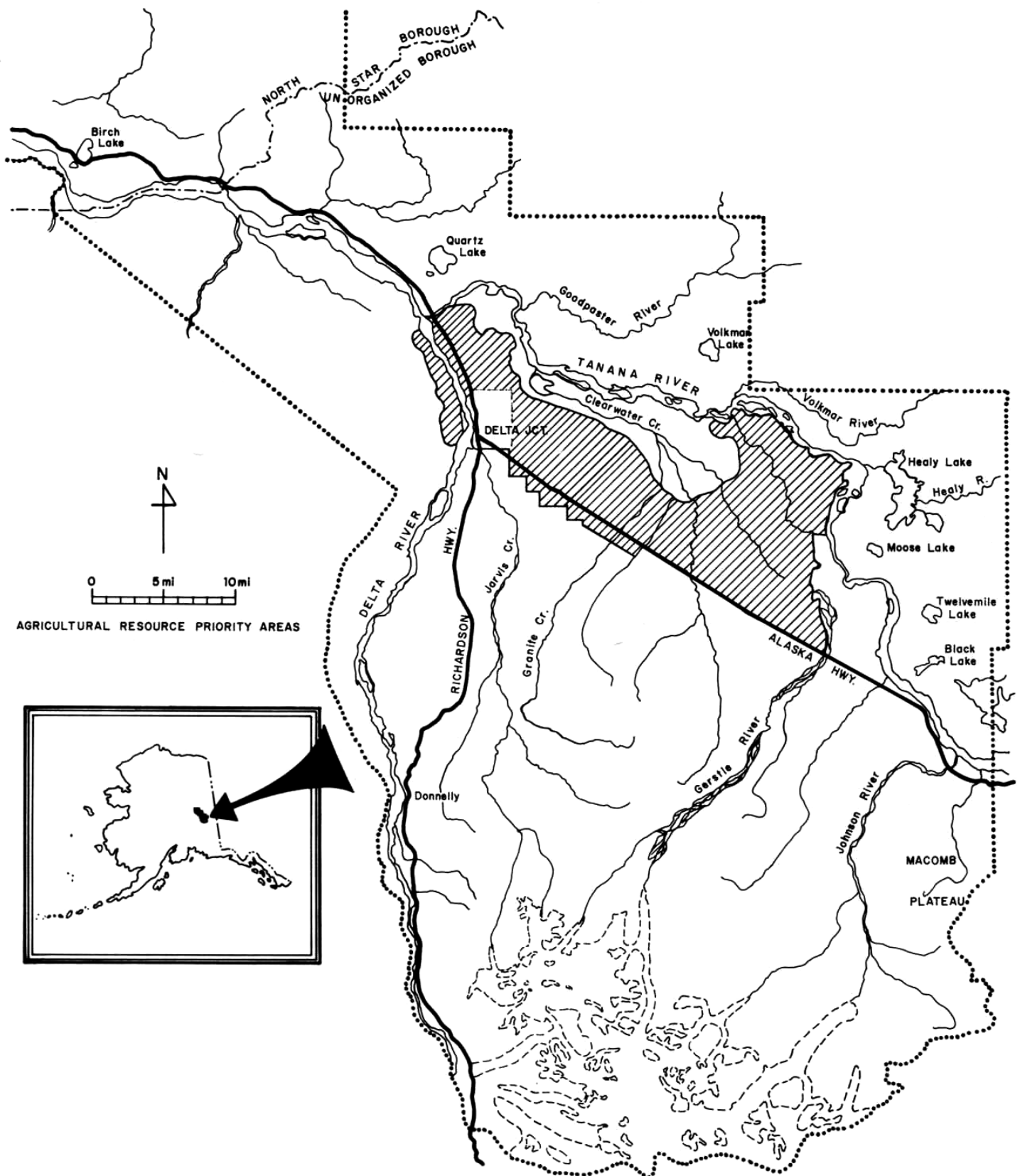
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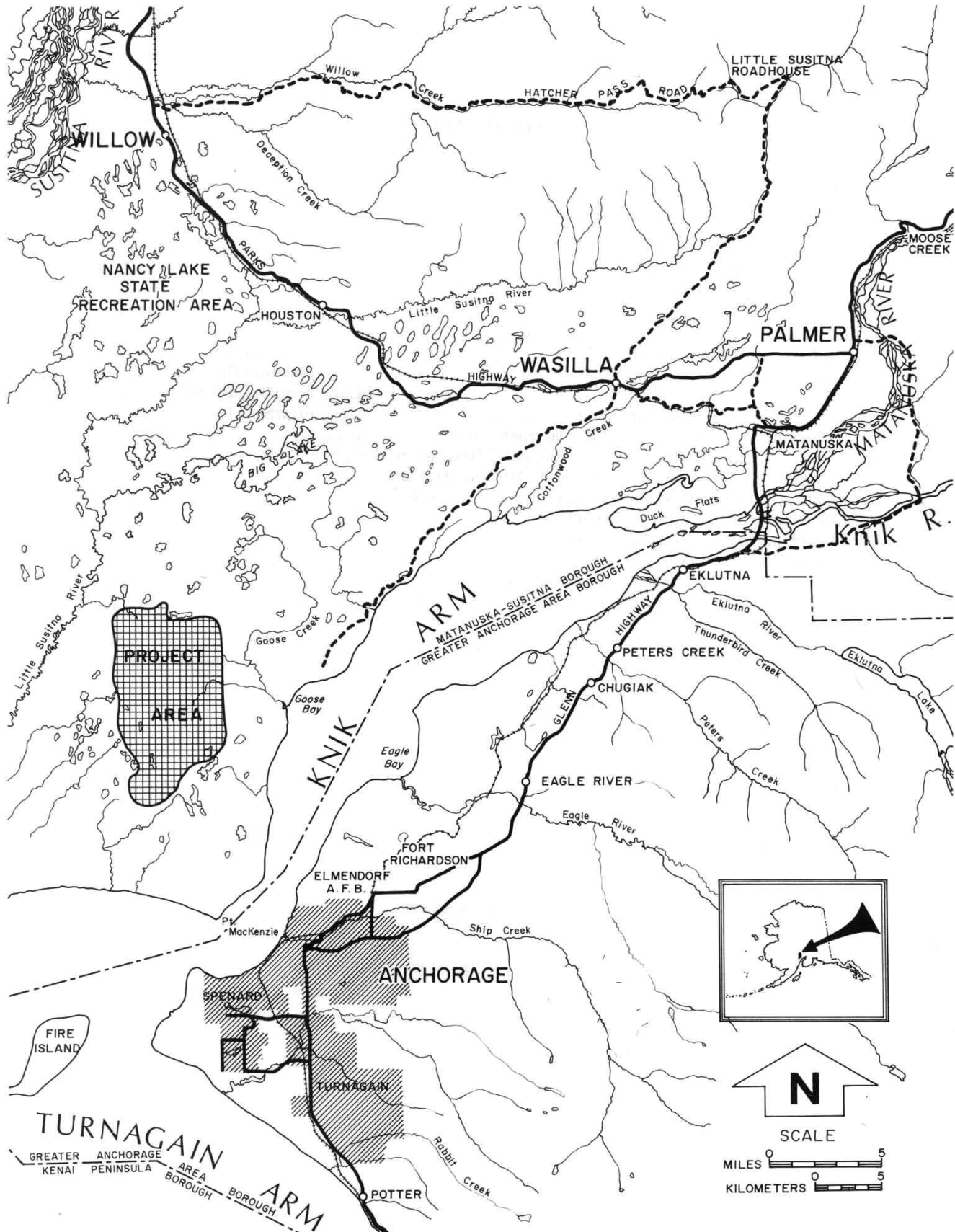
## APPENDIX A: MAPS OF PROJECT AREAS

### Delta



Lewis, C.E. and F.J. Wooding. 1978. Barley production in the Delta-Clearwater area of interior Alaska. University of Alaska Agricultural Experiment Station Bull. 49.

## Point MacKenzie



Lewis, C.E., J.M. Harker, E.L. Arobio, and W.C. Thomas. 1980. Potential milk production in the Point MacKenzie area of southcentral Alaska. University of Alaska Agricultural Experiment Station Bull. 58.



## APPENDIX B: RAW DATA

Table 1. Direct appropriations made by the Alaska Legislature 1978-1982

Project	Year					Total
	1978	1979	1980	1981	1982	
Delta I	4,793,000	7,089,900	2,000,000	949,000	0	14,831,900
Delta II	0	0	0	9,001,900	0	9,001,900
Point MacKenzie	0	0	5,025,000	0	238,000	5,263,000
Nenana-Totchaket	0	0	500,000	500,000	0	1,000,000
Infrastructure*	0	0	0	11,150,000	0	11,150,000
					<b>TOTAL:</b>	<b>41,246,800</b>

\*includes processing facilities, export terminal, rail hopper cars, and marketing

Source: Teal, D. 1982. Financing agricultural projects in Alaska. Juneau: State of Alaska, House Research Agency report 81-5

Figure 1. Alaska Cropland Utilization, 1976–2005

year	acres
1976	19017
1977	19005
1978	20181
1979	20432
1980	30484
1981	36881
1982	25284
1983	34671
1984	41503
1985	36351
1986	30040
1987	29134
1988	26344
1989	22422
1990	24200
1991	25653
1992	23016
1993	27758
1994	28940
1995	30726
1996	31322
1997	31064
1998	34184
1999	31340
2000	28256
2001	33903
2002	31095
2003	31807
2004	31312
2005	29895

Figure 2. Alaska Acreage Planted in Barley, years 1975–2005

year	acres planted
1975	1,600
1976	1,400
1977	3,100
1978	4,300
1979	6,500
1980	14,000
1981	16,500
1982	8,500
1983	16,000
1984	17,500
1985	13,000
1986	8,000
1987	6,000
1988	5,300
1989	5,100
1990	5,700
1991	5,200
1992	3,500
1993	4,700
1994	6,600
1995	7,500
1996	7,200
1997	7,200
1998	7,100
1999	5,400
2000	5,300
2001	5,800
2002	4,200
2003	4,000
2004	4,600
2005	4,600

Figure 5. Alaska Milk Production, years 1975–2005

year	lbs (1,000)
1975	16,800
1976	16,000
1977	16,400
1978	14,800
1979	13,000
1980	12,500
1981	13,400
1982	13,800
1983	13,500
1984	13,900
1985	22,200
1986	31,500
1987	34,800
1988	30,700
1989	23,300
1990	16,800
1991	13,300
1992	12,200
1993	11,900
1994	12,600
1995	11,900
1996	13,500
1997	15,000
1998	14,300
1999	13,600
2000	13,050
2001	14,360
2002	17,680
2003	16,700
2004	14,600
2005	13,500

Figure 3. Alaska Cash Receipts for Barley, 1977–2005. PPI (all commodities), not seasonally adjusted, normalized to 2006.

year	barley cash receipts	PPI	2006 \$
1976	217,000	0.3708	585,221
1977	364,000	0.3935	925,032
1978	496,000	0.4243	1,168,984
1979	783,000	0.4776	1,639,447
1980	886,000	0.5448	1,626,285
1981	869,000	0.5947	1,461,241
1982	997,000	0.6067	1,643,316
1983	1,059,000	0.6142	1,724,194
1984	1,409,000	0.6289	2,240,420
1985	557,000	0.6257	890,203
1986	373,000	0.6077	613,790
1987	442,000	0.6237	708,674
1988	581,000	0.6487	895,637
1989	636,000	0.6809	934,058
1990	264,000	0.7055	374,203
1991	634,000	0.7069	896,874
1992	362,000	0.7109	509,214
1993	419,000	0.7214	580,815
1994	509,000	0.7307	696,592
1995	951,000	0.7569	1,256,441
1996	646,000	0.7746	833,979
1997	465,000	0.7741	600,698
1998	301,000	0.7548	398,781
1999	459,000	0.7612	602,995
2000	325,000	0.8053	403,576
2001	602,000	0.8141	739,467
2002	455,000	0.7954	572,039
2003	437,000	0.838	521,480
2004	450,000	0.8898	505,732
2005	660,000	0.9549	691,172

Figure 4. Barley Prices for the United States, ND, and AK. \$/bushel, 1970–2006. PPI (all commodities), not seasonally adjusted, normalized to 2006.

		\$/bu	\$/bu	\$/bu
PPI**	Year	US	ND	AK
0.223874	1970	\$4.35	\$3.75	\$8.49
0.231205	1971	\$4.29	\$3.37	\$8.00
0.241418	1972	\$5.01	\$4.31	\$8.08
0.273169	1973	\$7.83	\$7.65	\$13.18
0.324486	1974	\$8.66	\$9.55	\$12.79
0.354416	1975	\$6.83	\$7.19	\$11.57
0.370898	1976	\$6.07	\$6.04	\$10.52
0.393599	1977	\$4.52	\$3.91	\$9.65
0.424339	1978	\$4.52	\$4.19	\$8.96
0.477628	1979	\$4.75	\$4.40	\$6.28
0.544871	1980	\$5.12	\$4.92	\$5.51
0.594772	1981	\$4.17	\$3.70	\$6.89
0.606805	1982	\$3.59	\$2.90	\$5.93
0.614288	1983	\$4.02	\$3.58	\$5.37
0.629	1984	\$3.64	\$3.08	\$4.85
0.625815	1985	\$3.16	\$2.56	\$4.63
0.607715	1986	\$2.65	\$2.25	\$4.11
0.623742	1987	\$2.90	\$2.73	\$4.49
0.648819	1988	\$4.32	\$4.58	\$5.24
0.680975	1989	\$3.55	\$3.16	\$4.99
0.705546	1990	\$3.03	\$2.66	\$4.68
0.707012	1991	\$2.97	\$2.50	\$4.74
0.711007	1992	\$2.87	\$2.45	\$4.71
0.721422	1993	\$2.76	\$2.34	\$0.00
0.730775	1994	\$2.78	\$2.56	\$0.00
0.756914	1995	\$3.82	\$3.86	\$0.00
0.77466	1996	\$3.54	\$3.12	\$0.00
0.774154	1997	\$3.07	\$2.53	\$4.13
0.754942	1998	\$2.62	\$2.21	\$4.77
0.761262	1999	\$2.80	\$2.51	\$4.93
0.805349	2000	\$2.62	\$2.02	\$4.47
0.814146	2001	\$2.73	\$2.10	\$4.18
0.79549	2002	\$3.42	\$3.22	\$4.46
0.83801	2003	\$3.38	\$3.09	\$4.24
0.889883	2004	\$2.79	\$2.38	\$3.88
0.954952	2005	\$2.65	\$2.08	\$3.82
1	2006	\$2.85	\$2.60	\$3.55

\*\* , PPI (all commodities), not seasonally adjusted, normalized on 2006

## ABOUT THE AGRICULTURAL AND FORESTRY EXPERIMENT STATION

The federal Hatch Act of 1887 authorized establishment of agricultural experiment stations in the U.S. and its territories to provide science-based research information to farmers. There are agricultural experiment stations in each of the 50 states, Puerto Rico, and Guam. All but one are part of the land-grant college system. The Morrill Act established the land-grant colleges in 1862. While the experiment stations perform agricultural research, the land-grant colleges provide education in the science and economics of agriculture.

The Alaska Agricultural Experiment Station was established in Sitka in 1898, also the site of the first experiment farm in Alaska. Subsequent stations were opened at Kodiak, Kenai, Rampart, Copper Center, Fairbanks, and Matanuska. The latter two remain. The Alaska station was not originally part of the Alaska land-grant college system. The Alaska Agricultural College and School of Mines was established by the Morrill Act in 1922. It became the University of Alaska in 1935. The Fairbanks and Matanuska farms are part the Agricultural and Forestry Experiment Station of the University of Alaska Fairbanks, which also includes the Palmer Research Center.

Early experiment station researchers developed adapted cultivars of grains, grasses, potatoes, and berries, and introduced many vegetable cultivars appropriate to Alaska. Animal and poultry management was also important. This work continues, as does research in soils and revegetation, forest ecology and management, and rural and economic development. Change has been constant as the Agricultural and Forestry Experiment Station continues to bring state-of-the-art research information to its clientele.

## Agricultural and Forestry Experiment Station

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